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Patentanmeldung Nr.   Patent application No.   Demande de brevet n°

00810610.6

Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets
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Sheet 2 of the certificate
Page 2 de l'attestation

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DESCRIPTION

Method and System for Implementing
Process-based Web Applications

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Introduction and Prior Art

The present invention relates to a novel system for implementing Web applications or, more general, to the structure and design of web applications or solutions, i.e. Internet or intranet solutions. Present day Web applications of this

10   kind are often ad hoc developed, therefore hard to adapt to the fast moving requirements of the market and thus expensive in the long run. Also, it is becoming difficult to find the persons skilled in the art able to develop, test, and implement such applications. The present invention provides a systematic, computerized approach for solving this dilemma by using, in brief, a graphical

15   model for describing and simulating the process of the desired application and an automated, computer-controlled way for enabling or implementing the modeled solution.

The program logic or process behind today's e-commerce and business-to-

20   business solutions and most other Web solutions are usually so-to speak "hard-coded" in software - thus in a sense "hard-wired". This makes them inflexible and difficult to change and requires special knowledge to make even minor changes. Also, the business processes often have not been adapted to fit the new way of doing business. In many cases, Web applications are not

25   properly integrated into the overall respective business processes.

For a number of years, processes of various kinds, e.g. business processes, or processes in governm nt administration, are being recorded and documented; incr asingly also process modeling and simulation is don to optimize such

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processes. European pat_nt application 99 81 0520.9, equivalent to US patent application, serial no. 09/590 744, describes an example. But more and more the automation of processes, or at least their efficient support by information technology (IT), is becoming the center of attention. Therefore, newer business

5 solutions are workflow-based where the workflow actually is the automation of the underlying process. Also, communicating process innovations to the people involved will be ever more important. With Web applications becoming relevant for the business as well as for the public service sector, most present approaches are inadequate and their cost will soon become unacceptable.

10

What appears to be needed are process-based Web applications and solutions whose behavior is largely defined by processes as mentioned above: by business processes, by technical processes, and/or by administrative processes.

15 Most of today's IT systems or applications actually have a behavior given by an underlying process, but this process is often implicit in the solution and can neither be readily understood nor easily modified. By making the process explicit in the solution, it becomes much easier to specify, implement, and adapt such systems to changing needs.

20

The Invention

Generally speaking, the present invention is a generic approach to making a process underlying a given application explicit so that it becomes easy to design and implement Web applications in an elegant and flexible way. In princi-

25 ple, this is achieved by drawing a process model expressing clearly and easily what the desired application has to do, then possibly (and preferably) simulating the desired application, and finally automatically generating the application by using the process module as the controlling engine of the application. No other workflow system or similar additional hardware or software is required.

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The invention provides such a process-based generic Web application, which is - simply speaking - built on an already existing, advanced and easy to use process modeling and optimization tool as described in the above-cited European patent application 99 81 0520.9 (or US patent application serial no.
5   09/590 744). But in the present invention, the modeled processes serve an additional purpose as compared to this prior art: They become the controlling part of the application by linking the model simulator to a Web server via a servlet, and thus the run-time application itself is obtained.

10   A servlet is intended to extend a server's functionality and one may think of it as a server side applet. In much the same way an applet extends the functionality of a browser, a servlet extends the server's functionality.

The present invention is, so-to-speak, a "WISIWIG Generic Application Sys-
15   tem" or a process-based Web application platform. It can be readily adapted to given requirements without the need for any programming knowledge, since the application's program logic is defined with the process model that can be set up in an intuitive way. A powerful palette of modeling elements may be used together with built-in dialog and database access assistants. Interaction between
20   the user and the application occurs via a common Internet browser. These interaction dialogs, or rather dialog pages, may be graphically enhanced with known HTML or XML tools.

In other words, the invention is a generic Web (Internet or Intranet) solution
25   whose dynamic behavior is defined by a process module. This process module is the core of the whole application: the complete process can be simulated and animated in said process module before it is automatically converted into the run-time application. The simulator within the process module becomes the workflow engin in the run-time system which is coupled via a servl t to a Web
30   server or similar computing engin , thereby controlling the interactions with any

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client, e.g. an Internet or intranet user, according to the modeled process. The users interact with the novel system through any of the usual Internet browsers. Also, the system administrator(s) may interact with the system in much the same way, e.g. for content management, process adaptations etc., whereby

5   the respective management or administration processes are set up (and modified) in the same way as the actual application processes.

The process module, i.e. the process model contained in the module, can access external databases and/or application modules, e.g. an e-mail system,

10   transaction monitor etc. So-called standard elements as described in the above cited European patent application 99 81 0520.9 (US patent application serial no. 09/590 744) provide an easy and intuitive way for any user for building and/or modifying the process model, without any programming knowledge or input.

15

Further, the dialogs between a system according to the invention and a user are most easily arranged by an assistant or wizard integrated into the system. Such an assistant may be directly called from the dialog standard elements (see below). The position of the dialog element within the process model de-

20   termines the point in time at which the dialog appears within the user's browser; with the assistant, the information displayed to the user (or the information required from the user) are determined by the dialog form set up with the assistant. The dialog pages may of course be graphically arranged and elaborated, e.g. with an HTML tool. Those areas in the dialog page that are crucial to the

25   information exchange are automatically marked to protect them from accidental manipulation.

Another assistant or wizard associated with the database step (see below) makes th definition of database accesses within the process very easy and

30   intuitive, again without needing any programming.

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For implementing the solution according to the invention, process module, Web server, database(s), browser for the interaction, etc. are preferably installed on a single computer, PC or workstation. However, other, e.g. "distributed" solu-
5 tions are as well possible.

Essentially, the system works stepwise in two modes. The first mode is a design or prototyping mode, in which the controlling process model and the necessary dialogs, database-accesses, etc., are designed. When this is done, the
10 system is tested and can be demonstrated. Since the used process module allows an animation of the designed process model, the working of the model and the actions of the application, particularly the interactions with the user, can be permanently observed, thus providing a complete and transparent picture to the prospective user(s) and operator(s) of the system, possibly providing new
15 insights regarding the application. Since the system can easily be changed in this prototyping and testing mode, the resulting solutions are extremely adaptive and flexible.

In this first mode, the use of a "local server", i.e. a kind of emulated server on
20 the PC or workstation, is preferred, since a stand-alone solution appears to be the most flexible arrangement for designing and prototyping.

The second mode is the enabling or implementing mode. The local server, as defined above, is replaced by a "real" server connected to the Internet or intra-
25 net, which server is coupled via a servlet with the process module. Now, the tested process-based application prototype is turned into the run-time web application. Essentially, this is done by uploading the tested process module together with the servlet onto the Web server.

30 Vice versa, a download of the run-time proc ss module from the Web server to

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a local host brings it back into the prototyping mode, to e.g. add, modify, and/or test further steps within the solution. After a satisfying test, the process module is again uploaded to the real server and turns into a (now modified) run-time version.

5

Hence, with the invention, Web applications are obtained in an almost playful graphical way:

10　- in the design/prototyping mode, the process is drawn as model that expresses what the application should do; or simpler yet, a given reference model that comes close to the desired application is chosen and adapted to the actual needs;

- the dialog wizard is used within the dialog steps to define the information to be exchanged in a particular client interaction;

15　- the data required in various process elements are entered via the masks associated with these elements, e.g. database path, selection criteria, attribute values to be used, etc.;

- the prototype is animated and tested;

- the result is uploaded to the actual server (one's own or an an application

20　service provider's server) .

The program logic of the solution is thus defined and implemented with a graphical process model. As mentioned, these models are built using standard elements (or components containing such elements) as described in European

25　patent application 99 81 0520.9 (US patent application serial no. 09/590 744). In addition to the control elements and workflow steps used for usual process simulation and optimization, new process elements are needed in the present invention to interact with the real world, e.g. for client-system interaction (dialog steps), database access, or acc ss to existing transaction modules etc. Hence,

30　a special augmented element palette is made available in the system according

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to the invention for the efficient d_sign of application process s and th r
automatic conversion to the run-time solution.

Description of an Embodiment of the Invention

5   In the following, an example how to implement the present invention will be
shown and described. A figure illustrates this implementation:

Fig. 1   shows a general layout of the architecture of the invention.

10   The general architecture of a system according to the invention as shown in
Fig. 1 ties together a Web server 1 which includes a servlet 2, a browser 3 for
the interaction dialogs, one or more databases 4 and possibly other external
modules 6 and/or 7.

15   The process module 5 controls the behavior of the application. As addressed
above, the application has two modes: a design/prototyping mode where eve-
rything runs essentially on the same computer, and a run-time or implementa-
tion mode where the application runs on the Web server connected via the
Internet or Intranet to any client machine. In this latter run-time mode, the
20   simulation engine of the process module becomes the workflow engine of the
application. It is connected with the Web server via a servlet 2, which actually
forms an extension to the common Web server.

The data bases 4 (and/or other external modules 6 and/or 7) can be accessed
25   through special process elements, further described below.

As described in European patent application 99 81 0520.9 (US patent applica-
tion serial no. 09/590 744), the special process elements needed here are
made from a few fundam ntal base elements (at present three base lements),
30   so-called quarks. This means that additional special elements can be created

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efficiently whenever new types of applications should require them.

The system according to the invention preferably has an element palette featuring the following types of standard elements:

5

- *Control elements:* they are used to define the data flow control in a process and are mostly the same as those used in the embodiment of European patent application 99 81 0520.9 (US serial no. 09/590 744). There is one important exception, however: the so-called "Start Request", which differs

10   essentially from the "Start Element" (or generator) of Fig. 4 in the above cited European patent application 99 81 0520.9 (US patent application serial no. 09/590 744). Where the latter represents an event generator, the Start Request Element reacts now to a real Web server requesting the execution of the controlling application process, hence links the process model

15   to what is happening in the real world.

- *Transaction elements:* e.g. the "Transformation Step" is almost identical to the Step Element, of which a quark representation is given in above cited European patent application 99 81 0520.9 (US patent application serial no.

20   09/590 744). This element is used in the context of the present invention to carry out computations on the data flowing through the process. A new standard element is the "Database Step" allowing very simple access to databases.

25 - *Communication elements:* included is an "e-Mail Step" to automatically launch an e-mail over the Internet or intranet, e.g. to confirm an e-commerce order. Another standard element in this group is the "SMS Step" to generate short messages for the mobile user. A so-called "Trigger Step" is used to start any required back end or supply chain process (i.e. work-

30   flow) over th intranet or Internet, that may also be implemented using a

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system according to the invention. This allows creating complete business-to-business, e-commerce or e-government solutions in a consistent and transparent way.

5   With a special process element, the system will also be able to access automatically other Web sites or applications respectively, making use of the Web as a huge pool for information and other resources that may be needed by the application.

10   As with the standard elements described in above cited European patent application 99 81 0520.9 (US patent application serial no. 09/590 744), parameters and other data required by the element can be entered via associated masks; e.g. the database path for the Database Step, certain selection criteria, attribute values to be used from the object flowing into the element, etc.

15
As already addressed above, the system according to the invention operates to develop and implement Web applications in the following way:

-    In the design mode, the user literally draws a process model, which ex-
20   presses what the Web application shall do, or he/she selects a reference model which is sufficiently similar to the desired solution and adapts the latter to the problem to be solved. The user may employ the dialog wizard to define the information to be entered for a particular client interaction. The data required in the various process elements are entered via the masks
25   associated with these elements, e.g. database paths, selection criteria, attribute values to be used, etc.

-    Still in the design mode, the user may animate and test the thus developed prototype. This intermediate step, a so-to-speak "test mode" may be re-
30   peated after modifications have been executed in th previous steps until a

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satisfactory result is achieved.

- In the implementation mode, the user uploads the prototyped solution to a server actually connected to the Internet or intranet, whatever is applicable.

5   The process model now turns into the run-time engine of the implemented solution.

As can be seen from the above, the program logic of the solution is defined and implemented with a graphical process model. As already mentioned, these

10   models are built using standard elements (or components containing such elements). In addition to the control elements and workflow steps used for process simulation and optimization in the process tool, as described in the above-mentioned European patent application 99 81 0520.9 (US patent application serial no. 09/590 744), new process elements are needed to interact with the

15   real world, e.g. for client-system interaction like the dialog control, for database access, or for the access to existing transaction modules. Hence, the special, augmented element palette described above is made available in the solution according to the invention for the efficient development of application proc-esses.

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CLAIMS

1. A method for modeling and implementing applications, preferably Web ap-
    plications, using a computerized process model and a computerized inter-
5   face for implementing said model as a run-time application, wherein
    -   in a design or prototyping mode, said process model is drawn up ac-
        cording to the desired application by using an extendable set of building
        blocks and a preferably automated dialog for defining information
        needed by the process,
10   -   entering the data corresponding to said information needed,
                -   animating and/or testing the thus designed prototype,
    -   in an implementing mode, uploading the final prototype of said applica-
        tion defined by said process model via said interface into a server or
        similar networked computer to obtain the run-time implementation of
15   said application.

2. The method according to claim 1, wherein the application is defined by
    more than one process or process model.

20 3. The method according to any preceding claim, wherein
    in the design mode, the process is graphically displayed and may be modi-
    fied by graphical means and/or elements.

4. The method according to any preceding claim, wherein
25 in the design mode, and before starting the implementing mode, the proto-
    type may be modified and/or re-designed until a desired functional object or
    goal is reached.

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5. The method according to any preceding claim, wherein
    in the design mode, the automated dialog is implemented as a step-by-step
    dialog and the displayed process step-wise modified accordingly whenever
    data is entered.

5

6. The method according to claim 5, wherein
    during the automated dialog, graphical masks are provided, preferably close
    to displayed corresponding process elements, into which masks the re-
    quired data are entered.

10

7. The method according to claim 1, wherein
    the interaction with an application user is carried out via a common Internet
    browser.

15 8. The method according to claim 7, wherein
    specially marked areas are provided on the information pages presented to
    the user, said areas being preferably invisible to the user, where information
    exchange takes place with the user, thus protecting them from accidental
    manipulation.

20

9. The method according to any preceding claim, wherein
    some processes may be started automatically from processes of another
    application rather than directly from an application user.

25 10. The method according to any preceding claim, wherein
    a process or sub-process is integrated into a dialog page such that it is exe-
    cuted not on a server but on a client machine, thus executing the run-time
    application in a distributed way.

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11. The method according to any preceding claim, wherein some of the process models are not defining the application itself but rather its management and administration.

5   12. An integrated, computerized system for modeling and implementing an application with a process model and an interface for implementing the model, including

- means for displaying a model of said process,
- means for executing automated dialogs between a user and said process

10   model, including means for entering data into said process model and means for controlling changes of said process model to develop and/or amend a prototype of the desired process,

- means for animating and/or testing said thus designed prototype,
- means for implementing said process model by uploading the final proto-

15   type of said process via said interface into a server connected to the Internet or an intranet.

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ABSTRACT

**Method and System for Implementing
Process-based Web Applications**

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This invention relates to the structure and design of a method and a system for designing and implementing Web applications in an automated, computerized way without any computer programming. In principle, this is achieved by literally drawing a process model expressing what the desired Web application

10 should do, then preferably simulating and/or testing the desired application, and finally automatically enabling the application by using the process model as the controlling engine of the application. No other workflow system or similar additional hardware or software is required.

15 The invention provides such process-based Web applications by building on an already existing process modeling and optimization tool, but which is now extended to not only create a process model of the application, but also to turn this process model into the controlling part of the application and thus becoming the run-time application itself. It can be readily adapted to given require-

20 ments without requiring any programming knowledge, since the behavior of the application is given by the, preferably graphical, process model and all communications between users and application may be defined by integrated assistants or wizards and/or using common HTML or XML tools.
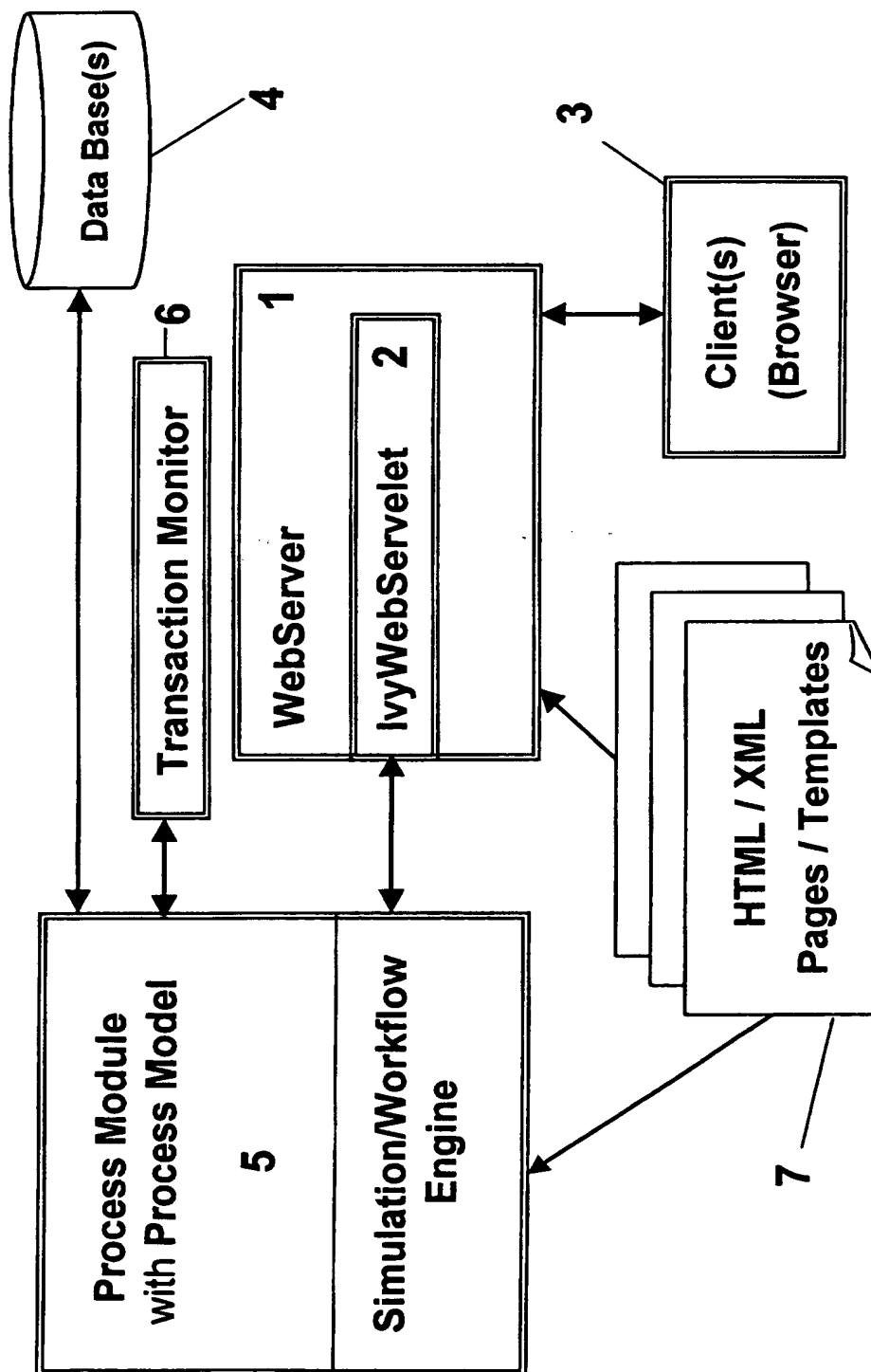

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Fig. 1

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